EPA/ROD/R02-93/206
1993

EPA Superfund
Record of Decision:

UNIVERSAL OIL PRODUCTS (CHEMICAL DIVISION)
EPA ID: NJD002005106
OU 01
EAST RUTHERFORD, NJ
09/30/1993

ROD FACT SHEET

SITE
Name: Universal Oil Products
Location/State: East Rutherford, New Jersey
EPA Region: II
HRS Score (date): 54.63 (8/4/82)

ROD
Date Signed: September 30, 1993
Remedies: Containment of lead contaminated soils, treatment of volatile organic (VOC), polychlorinated biphenyl (PCB), and polynuclear aromatic hydrocarbon (PAH) contaminated soils with thermal desorption, collection and treatment of leacheate.

Operating Unit Number: OU-1

LEAD
Lead: New Jersey State Enforcement Lead
Primary contact: Gwen Barunas (609) 633-1455
Secondary contact: Roman Luzicky (609) 633-1455
Main PRP(s): Allied Signal
PRP Contact: Mark Kamilow (201) 455-2119

WASTE
Type: PCBs, PAHs, VOCs, Lead
Medium: Soils: PCBs, PAHs, and VOCs. Leacheate: VOCs
Origin: Chemical Processing Plant
Est. quantity: 5.6 million gallons of leacheate, 16,000 yd[3] of PBC/PAH contaminated soil, 7,000 yd[3] of VOC contaminated soil, 3.7 acre area of lead contaminated soil.

Declaration for the Record of Decision

Site Name and Location

Universal Oil Products (Chemical Division)
Borough of East Rutherford, Bergen County, New Jersey

Statement of Basis and Purpose

This decision document presents the selected interim remedial action for Operable Unit One at the Universal Oil Products (UOP) site, in the Borough of East Rutherford, Bergen County, which was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This decision document explains the factual and legal basis for selecting the remedy for this site and is based on the information contained in the administrative record for this site.

The N.J. Department of Environmental Protection and Energy serves as the lead regulatory agency at the UOP site. As the lead agency, the Department has directly overseen all activities at the site.

The U.S. Environmental Protection Agency (EPA) serves as the support agency at the UOP site. The EPA concurs with the selected remedy.

Assessment of the Site

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

Description of the Selected Remedy

The response action described in this document represents an interim remedy for the first of three planned operable units at the site. Operable Unit One consists of the uplands soils and leachate at the site; Operable Unit Two includes the two wastewater lagoons; and Operable Unit Three consists of the site stream channels (see Figure 1). The selected interim action will address the threats due to contaminated soils and contaminated leachate, designated as Operable Unit One. It addresses the principle threats through treatment of the most highly contaminated materials and the lower level threats through containment. Since a portion of the selected remedy calls for the containment of contaminated soils, the remedial action for Operable Unit One will require long-term management.

The major components of the selected remedy include the following:

For Polychlorinated Biphenyl/Polycyclic Aromatic Hydrocarbon Contaminated Soils:

- On-site thermal desorption of highly contaminated soil (6800 cubic yards), and placement of treated soils on site

- Soil cover for less contaminated soil (4.9 acres)

- Institutional controls

For Volatile Organic Compound-Contaminated Soils:

- On-site thermal desorption (7000 cubic yards), and placement of treated soils on site

For Lead-Contaminated Soils:

- Soil cover/cap (3.7 acres)

- Institutional controls

For Volatile Organic Compound-Contaminated Leachate

@ Leachate collection trenches and pits (5.6 million gallons)

- On-site treatment of leachate

- Discharge of treated effluent to ground water

Declaration of Statutory Determinations

The selected interim remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action and is cost effective. In accordance with EPA "Guidance on Remedial Actions for Superfund Sites with PCB Contamination," a waiver of the Toxic Substances Control Act landfill requirements is being granted in this ROD for the UOP site. This remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable, and it satisfies the statutory preference for remedies that employ treatment that reduce toxicity, mobility, or volume as a principal element. Subsequent remedial actions are planned to address fully the principal threats posed by other operable units at this site. Because this remedy will result in hazardous substances remaining on site, a review will be conducted within five years after commencement of the remedial action to ensure that the interim remedy continues to provide adequate protection of human health and the environment.

Decision Summary for the Record of Decision

1. Site Name, Location, and Description

Universal Oil Products UOP is a 75 acre site located in the Borough of East Rutherford, Bergen County, New Jersey. A portion of the site is located in the Hackensack Meadowlands District, which is administered, in part, by the Hackensack Meadowlands Development Commission. It is bounded on the north primarily by a compressed gas facility, on the east by Berry's Creek, on the south by commercial properties, and on the west by New Jersey Route17 (See Figure 1).

The UOP property is flat (elevations vary from 4 to 9 ft above mean sea level) and partly covered by tidal salt marsh. A system of natural and artificial surface-water channels crosses the property. The property was developed as an industrial facility in 1932. The property usage remained industrial until operations ceased in 1979.

The UOP property is surrounded by undeveloped tidal marshes, highways, and commercial and light industrial properties. Immediately to the north is the Matheson Air Products facility, a metal finishing facility, a truck and car repair shop, and a hotel. To the east are Berry's Creek and tidal marshes. To the south are commercial properties. To the west is New Jersey Route 17. West of Route 17 are a Becton Dickinson manufacturing facility and commercial properties. The closest residential area is approximately one-half mile to the west of Route 17.

The UOP site occupies part of the Berry's Creek drainage basin. An Environmental Impact Statement (EIS) was prepared for the adjacent New Jersey Sports and Exposition Complex (Jack McCormick and Associates, 1978). That report described the various natural resources found in the area of UOP. Many flora and fauna are found in the vicinity of the UOP site including dense stands of common reed grass, other various wetlands plant species, sixty five kinds of birds, many mammals, one amphibian and three reptile species.

As stated above, the site is crossed by various man-made and natural channels, commonly referred to as Ackerman's Creek, that drains to Berry's Creek, a tributary to the Hackensack River. These surface water bodies are all tidally affected and have relatively high salinity concentrations.

Wetlands exist on site. Also due to its location, the site is regularly subject to tidal flooding.

Ground water at the site exists in two units. The upper unit consists of a layer of fill on top of an organic layer called meadow mat. This unit at UOP is isolated horizontally by the on-site surface water bodies and is generally brackish. Also, due to the nature of the fill material, aquifer yields are very low in this formation. For these reasons, the shallow aquifer in the vicinity of the site has never been developed for potable use. A deeper aquifer, located in the Brunswick formation, is separated from the shallow aquifer by approximately 100 feet of varved clay. Due to the site's location in the Hackensack Meadowlands, a regional discharge area, the vertical hydraulic gradient tends to be upward.

2. Site History and Enforcement Activities

The property was developed in 1932 by Trubeck Laboratories, which built an aroma chemicals laboratory. Trubeck began operating a solvent recovery facility and handling waste chemicals in 1955. In 1956 Trubeck constructed a wastewater treatment plant, and in 1959 began utilizing two wastewater holding lagoons. UOP Inc. acquired the property and facilities in 1960. Use of the waste treatment plant and wastewater lagoons ceased in 1971. All operations at the facility were terminated in 1979. In 1980 all structures, except concrete slabs and a pipe bridge over the railroad tracks, were demolished. During the years of operation, both the waste water lagoons and the routine handling of raw materials and wastes resulted in the release of various hazardous substances to the soils and shallow ground water.

The New Jersey Department of Environmental Protection and Energy (NJDEPE) has overseen activities at the UOP site since 1982 under various Administrative Consent Orders (ACOs). The site was listed on the National Priorities List (NPL) on September 8, 1983. Current site work is being performed under a May 23, 1986 ACO between NJDEPE and UOP. Activities performed under this ACO have included the investigations of Operable

Unit One, the investigation of site stream channels (Operable Unit Three), and the removal of the two wastewater lagoons (Operable Unit Two) in 1990.

3. Highlights of Community Participation

The Remedial Investigation and Feasibility Study (RI/FS) Report and the Proposed Plan for the UOP site were released to the public for comment on August 10, 1992. These documents were made available to the public in both the administrative record and an information repository maintained at the NJDEPE offices in Trenton, NJ, the East Rutherford Municipal Building and the East Rutherford Municipal Library. The notice of availability for these documents was published in the Herald News on August 5, 1992. A public comment period on the documents was held from August 10, 1992 through September 8, 1992 (30 calendar days). In addition, a public meeting was held on August 13, 1992. At this meeting, representatives from the NJDEPE answered questions about problems at the site and the remedial alternatives under consideration. A response to the comments received during this period is included in the Responsiveness Summary, which is part of this Record of Decision ROD. During the public comment period, the U.S. Environmental Protection Agency 0(EPA) suggested that several changes be made to the proposed plan that was issued on August 10, 1992. Based on these comments, a second proposed plan was released for public comment on May 3, 1993. A second public comment period was held for the revised proposed plan from May 3, 1993 through June 1, 1993 (30 calendar days). The notice for the second public comment period was placed in the Herald News on May 1, 1993. No public comments were received during the second public comment period.

4. Scope and Role of Operable Unit or Response Action Within Site Strategy

As with many Superfund sites, the problems at the UOP site are complex. As a result, NJDEPE has organized the remedial work into three operable units. This ROD selects the first planned remedial action at the site, addressing Operable Unit One. Operable Unit One consists of the uplands soils and leachate at the UOP site. The response action described in this ROD is an interim action that addresses all known soil contamination and leachate that serves as a source of ground water contamination. A final action for ground water will be selected after completion of this interim remedial action. A removal action was performed by the responsible parties with NJDEPE oversight in 1990 for Operable Unit Two that consisted of the excavation and off-site disposal of two waste lagoons. Presently, a remedial investigation is being performed for Operable Unit Three, the stream channels. Further remediation of the former waste lagoons, Operable Unit 2, is contingent upon the remedy selected for Operable Unit 3, since part of these waste lagoons adjoin the creek.

The remedial action selected in the Record of Decision addresses several principal threats posed by the UOP site. These principal threats are Polychlorinated Biphenyl (PCB)/Polycyclic Aromatic Hydrocarbon (PAH)-contaminated soils, lead-contaminated soils, Volatile Organic Compound (VOC)-contaminated soils, and VOC-contaminated leachate (source areas of ground water contamination).

5. Summary of Site Characteristics

To facilitate investigations, the UOP site has been divided into six areas: Areas 1, 1A, 2, and 5 are the uplands area of the site; Area 3 is the former waste lagoons associated with the waste water treatment plant; and Area 4 is the on-site stream channels (see Figure 1). The remedial investigation (RI) for the upland areas at the UOP site has been performed in three phases. Phase I investigations were performed in 1984, and Phase II investigations were performed in 1985. Phase I initially characterized contamination distribution at the site. Investigations performed subsequent to Phase I built upon information from previous phases and filled in any data gaps that existed. The results of the first two phases are considered in the 1988 or Phase III RI report. The 1988 RI report serves as the main RI document. Remedial activities related to Areas 3 and 4 are being performed separately due to their unique qualities including different geographical locations, contaminants of concern, and physical characteristics (i.e., stream beds could not be investigated/remediated in a manner similar to soils).

The remedial investigation of the uplands area included the installation of monitor wells and taking soil samples. The locations of these wells and samples are shown on Figures 2 and 3. The remedial investigations made several conclusions concerning site conditions at Areas 1, 1A, 2 and 5:

1. Area 1, 1A and 2 samples indicate the presence of VOCs in the following concentrations. Area 1 sampling results indicated that total VOCs in ground water ranged from Below Detection Limits (BDL) to 56 parts per million (ppm) and total VOCs in soil ranged from BDL to 74.8 ppm. Area 1A results demonstrated higher levels of total VOCs with ground water ranging from BDL to 66 ppm total VOCs and soil ranging from BDL to 1747 ppm. Area 2 had the highest total VOC levels with sampling indicating ground water levels from BDL to 210 ppm and soil levels ranging from BDL to 2108 ppm (See Figures 4, 5 and 6).

2. Base/neutral and acid-extractable (BNA) compounds were detected in ground water. These compounds were detected in areas also contaminated with VOCs. In general, these compounds occur at much lower concentrations than the VOCs. The highest concentrations were measured in Wells 13I, 21I, and 27I at 21 ppm, 10 ppm and 14 ppm, respectively (See Figure 3 for well locations).

3. Area 5 samples indicated that high levels of various base neutral compounds were present in surface soils. In particular, carcinogenic PAHs were detected in Area 5 soils (see Table 12 for list of carcinogenic PAHs). These carcinogenic PAHs were detected to levels of up to 1474 ppm (See Figure 8).

4. Area 5 samples also indicated that shallow soils were contaminated with PCBs. PCBs were detected at levels ranging from BDL to greater than 2000 ppm. The area with elevated levels of PCBs overlaps the area with elevated levels of carcinogenic PAHs. Also, a small portion of Area 2 was contaminated with PCBs (See Figure 7).

5. A separate portion of Area 5 has elevated levels of lead. Maximum levels of 14,100 ppm have been detected in Area 5. Lower levels of lead were detected in Areas 1 and 1A (See Figure 9).

In addition to the Remedial Investigation, a Seep/Sewer Investigation was performed in Areas 1, 1A, and 2 of the site. This investigation focused on an apparent seep discharging to Ackerman's Creek and the various sewers located in this portion of the site. A seep is an area where ground water is naturally discharged from an aquifer. The seep at UOP was attributed to the presence of an old storm sewer. Sediments within the sewer system contained elevated levels of VOCs and PCBs.

Based on the results of analytical sampling, various pathways for contaminant migration were evaluated. One pathway consisted of soil and ground water contamination migrating to the adjacent surface water bodies. Once contamination was in the surface water body, various biota and human populations could become receptors. In addition to the possible receptors from surface water contamination, other exposure pathways including direct contact with soils and ground water were considered during the RI/FS.

6. Summary of Site Risks

A baseline risk assessment was conducted by the responsible party under the direction of the NJDEPE. The purpose of the baseline risk assessment is to determine what risks are or may potentially be present if noremedial action is taken at the site. For the UOP site, both human health and ecological baseline risk assessments were performed. The human health portion of the assessment concentrated on the possible health effects due to contamination on the uplands area of the site (Operable Unit One). The ecological risk assessment mainly focused on the contamination in the stream channels. This ecological assessment included a food chain assessment. The ecological risk assessment for the uplands portion of the site consisted of a preliminary ecological survey.

The baseline human health risk assessment was conducted in a four step sequence. The steps consisted of the selection of indicator chemicals, the development of an exposure assessment, the development of a toxicity assessment and lastly, development of a site risk characterization.

The first step in the baseline human health assessment for the UOP site was the selection of indicator chemicals that would be representative of site risks. Selection of indicator chemicals was based on the analytical results of the Phase II and Phase III remedial investigations. The main criteria utilized for this selection were the relative concentration of substances at UOP and their relative toxicity. These criteria were utilized to calculate indicator scores for all potential indicator chemicals. Both the arithmetic mean and maximum concentration of contaminants were considered in developing the indicator scores.

Upon completion of the indicator scores, further screening was conducted based on site-specific information to identify the indicator compounds. Indicator compounds were selected for ground water, surface soils and subsurface soils. The selected indicator chemicals and their frequency of detection are listed in Table 1.

The second step in conducting the baseline risk assessment at the UOP site was to develop an appropriate exposure assessment to be utilized in calculating potential risk. This exposure assessment included identifying the appropriate exposure pathways (i.e., the ingestion of contaminated soils, etc.), identifying potentially exposed populations, using monitoring and modeling data to characterize exposure-point concentrations, and determining the appropriate assumptions to use concerning exposure frequency.

The first portion of the exposure assessment determined the appropriate exposure pathways to evaluate. Humans may potentially be exposed to contaminants in air, water or solid media (soils and sediments) directly, or through the food chain. The route of intake may be by ingestion, inhalation, or dermal absorption. Five pathways were deemed to be appropriate at the UOP site. These pathways are described in Table 2.

Another portion of the exposure assessment identifies the potentially exposed populations. In order to make this determinations, the present and future land use of the site and area were considered. Three potentially exposed populations were identified. These were young people trespassing on the property, an adult employee work force that would be present if the site was developed, and a construction worker population that would be present for a short period of time during any construction project.

After exposure pathways and exposed populations are determined, it is necessary to determine the concentration of contaminants that may be present at the point of exposure. Maximum concentrations and arithmetic means of analytical data were used as a starting point for determining the concentration at the point of exposure. Various assumptions and predictive models were then used to develop the concentrations of contaminants that would be present in the air and soil and available for uptake by the exposed population.

The final portion of the exposure assessment consisted of determining the appropriate assumptions to make concerning the various exposed populations. For example it was assumed that a trespasser would be on the site one hour per week, twelve months out of the year, and would inhale one cubic meter of air.

The third step in conducting a baseline risk assessment is performing a toxicity assessment. The purpose of this assessment is to determine doseresponse relationships for the indicator compounds present at the UOP site. For carcinogens, the dose-response relationship is translated to a slope factor. For non-carcinogenic substances, Reference Doses (Rfds) and Inhalation Concentrations (Rfcs) are developed that can be used to identify if an intake value is below the threshold value for an adverse effect to occur.

Cancer slope factors (CSFs) have been developed by EPA's Carcinogenic Assessment Verification Endeavor (CRAVE) for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CSFs, which are expressed in units of milligrams per kilogram per day (mg/kg -day)[1], are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CSF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to -human extrapolation and uncertainty factors have been applied. The CPFs used for the UOP risk assessment are listed in Table 3.

Reference Doses (Rfds) and Inhalation Concentrations (Rfcs) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. Rfds and Rfcs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals, that are not likely tobe without an appreciable risk of adverse health effects. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the Rfds and Rfcs. Rfds and Rfcs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the Rfds and Rfcs will not underestimate the potential for adverse noncarcinogenic effects to occur. The Rfds and Rfcs used for the UOP risk assessment are listed in Table 3.

The final step of the risk assessment consists of estimating the risk present at a site. This is computed by utilizing the information gathered during the three previous steps of the risk assessment process. Both the carcinogenic are non-carcinogenic risks are quantified.

Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g., 1x10[-6] or 1E-6). An excess lifetime cancer risk of 1x10=[-6] indicates that, as a plausible upper bound, an individual has a one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site. The total carcinogenic risk presented in the 1989 risk assessment ranged from 8.99x10[-5] for the present site use scenario to 8.06x10[-7] for the future site worker scenario. All individual and total carcinogenic risks associated with the site are listed on Tables 4, 5, and 6. All the calculated risks in the 1989 risk assessment were within or below EPA's acceptable risk range of 10[-4] to 10[-6]. Supplemental surface data collected in December 1989 and analyzed for PCBs and PAHs had higher levels of PCB and PAH contamination than earlier rounds. This new round elevated the maximum and average PCB and PAH concentrations (see Table 7). Based on this new data, risk levels were recalculated. The new risk levels ranged from 4.4x10[4] for the present use scenario to 1.28x10[-5] for the construction worker scenario
(see Table 8).

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the "hazard quotient" (HQ) or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's Rfd. By adding the HQ for all contaminants within a medium or across all media to which a given population may potentially be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. The calculated individual hazard indices and total hazard index are listed in Tables 9, 10, and 11.

Several sources of uncertainty exist in the risk assessment. These uncertainties generally can be placed into three categories:

1) Variance in analytical measurement techniques and the quality of the results 2) Uncertainty related to the human activities giving rise to exposure 3) Uncertainty related to dose-response extrapolation.

In order to minimize any underestimation of risk caused by these areas of uncertainty, many conservative assumptions were utilized in preparing the risk assessment.

The major finding of the risk assessment was that PCB and PAH contaminated soils presented unacceptable carcinogenic risk levels (up to 4.4x10[-4]). In addition to the baseline risk assessment, some other factors indicate that human health and the environment may potentially be affected at the site. EPA performed an independent risk evaluation for some compounds at the UOP site. This evaluation indicated that levels of 1,1,2,2,-tetrachloroethane in some site soils fell within the 10[-4] to 10[-6] risk range. Also, after completion ofthe risk assessment, additional samples were taken for lead. Results of these samples were a magnitude greater than previous samples with a maximum level of 14,100 ppm being detected. These levels of lead exceed EPA guidelines and NJDEPE's most recent general guidance. The New Jersey guidelines provide health based criteria designed to provide for the protection of human health across the State.

The Seep/Sewer Investigation evaluated the migration of VOCs and BNAs in ground water to surface water via ground water seeps related to the various sewer networks present at the UOP site. This study determined that relatively high levels of VOCs were present in the sewer system and were discharging to Ackerman's Creek. The study also demonstrated that while BNAs were present in the ground water, migration to the sewer system and stream is minimal.

In addition to human health risks, the risks to the environment were considered. A preliminary survey of terrestrial plants and wildlife on the site was conducted in October 1988. The survey of terrestrial animals and both woody and herbaceous vegetation indicated no differences between study and reference areas that might be associated with environmental impact. Based on the results of the preliminary survey, it was determined that no further studies were warranted. A more in-depth ecological risk assessment was performed for Operable Unit Three, the stream channels.

In summary, actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

7. Description of Alternatives

To aide in analyzing remedial alternatives for Operable Unit One, the UOP site was divided into four distinct remediation areas. These areas are based on contaminant type and media affected. The four areas are as follows:

- PCB/PAH-contaminated soil
- VOC-contaminated soil
- Lead-contaminated soil
- VOC-contaminated leachate

PCB/PAH-Contaminated Soil

The FS report provides a detailed evaluation of all options, referred to as remedial alternatives, to address PCB/PAH contaminated soils at the site. Detailed descriptions of all the remedial alternatives can be found in the FS report which is available in the Administrative Record repositories as previously noted in this decision document. The three most applicable PCB/PAH alternatives from the FS and the No Action alternative are presented here. Time to implement includes remedial design. Operation and Maintenance (O&M) costs are based on any maintenance costs associated with a potential remedy (e.g., cap maintenance) and general review costs. Remediation goals for PCB/PAH-contaminated soil are included on Table 12.

These alternatives are:

Alternative #P1: No Action

Capital Cost: $0.00
O & M Cost: $1300/year
Present Worth Cost: $40,000
Time to Implement: 0 months

The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison of other alternatives. The no action alternative would be appropriate if the potential endangerment is negligible or if implementation of a remedial action would result in a greater potential risk.

Because this alternative would result in contaminants remaining onsite, CERCLA requires that the site be reviewed every five years. If justified by the review, remedial actions may be implemented.

Alternative #P2: Soil Cover

Capital Cost: $470,000
O & M Cost: $2,600

Present Worth Cost: $550,000
Time to Implement: 28 months

This alternative consists of constructing a soil cover over soils that exceed the remediation goal. Approximately 4.9 acres would require placement of the soil cover. The cap would be a minimum 2 foot depth to prevent contact with contaminated soils. The construction of the cover would have to meet wetlands and soil erosion requirements. Also, any relevant flood plain requirements would have to be met. Institutional controls would be required due to the presence of contaminants above remediation goals. Because this alternative would result in contaminants remaining on-site, CERCLA requires that the site be reviewed every five years. If justified by the review, remedial actions may be implemented.

Alternative #P8: Soil Washing

Capital Cost: $8.2 M
O & M Costs: $2,600/year
Present Worth Cost: $8.3 M
Time to Implement: 50 months

Soil washing uses a solvent to separate contaminants from the soil. The contaminants can then be removed from the solvent, allowing the reuse of solvent and the destruction of contaminants off-site. 16,000 cubic yards of PCB/PAH-contaminated soil would be treated. This option would have to meet wetlands and soil erosion requirements during soil excavation. Treated soils will be returned to the excavation after treatment. Soil washing is considered an innovative technology. It may have some difficulty achieving remediation goals due to the high amount of clay and organic matter content in soils at the UOP site. A treatability study conducted for this technology verified this difficulty. Soils containing contaminant residues, perhaps at levels greater than the cleanup goals, may remain on-site. In the event that the PCB cleanup goal of 2 ppm is not met, a waiver of Toxic Substance Control Act (TSCA) chemical waste landfill requirements will be needed for this alternative. The presence of contaminants on-site would require that institutional controls be implemented. Because this alternative would result in contaminants remaining on-site, CERCLA requires that the site be reviewed every five years. If justified by the review, remedial actions may be implemented.

Alternative #P9: Thermal Desorption

Capital Cost: $11.0 M
O & M Cost: $2,600/year
Present Worth Cost: $11.1 M
Time to Implement: 47 months

Thermal desorption separates PCB/PAH contamination from soil by heating the soil. The separate vapor or liquid phase contaminants will then be taken off-site and destroyed. Thermal desorption is a newer technology but is commonly used to remediate sites contaminated by organic compounds. 16,000 cubic yards of PCB/PAH-contaminated soil would be treated. Treated soils will be returned to the excavation after treatment. Due to the clay and organic matter content of soils, it is questionable whether this technology can meet the remediation goals at the UOP site. Treatability studies have indicated that remediation goals may be met using this technology. In the event that such goals are not met, contaminant residues will remain on treated soils, and institutional controls would be needed. A waiver of TSCA chemical waste landfill requirements may be needed for this alternative. Because this alternative would result in contaminants remaining on-site, CERCLA requires that the site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes. This remedy also would require that wetlands and soil erosion requirements be met.

VOC-Contaminated Soils

The FS report provides a detailed evaluation of all options, referred to as remedial alternatives, to address VOC contaminated soils at the site. Detailed descriptions of all the remedial alternatives can be found in the FS report which is available in the Administrative Record repositories as previously noted in this decision document. The five most applicable VOC alternatives from the FS and the No Action alternative are presented here.The remediation goals for VOC-contaminated soils are listed on Table 12.

These alternatives are:

Alternative #V1: No Action

Capital Cost: $0.00
O & M Cost: $1300/year
Present Worth Cost: $40,000
Time to Implement: immediate

See description under Alternative #P1

Alternative #V4: Bioremediation

Capital Cost: $2.1 M
O & M Cost: $2,600/year
Present Worth Cost: $2.2 M
Time to Implement: 40 months

Alternative #V4 considers the bioremediation of VOC-contaminated soil. 7000 cubic yards of soil would require treatment. Bioremediation is an innovative technology that involves the breakdown of organic contaminants by naturally-occurring microbes. Environmental factors, such as Ph, nutrient levels, and temperature, are controlled in a reactor to maximize the rate of degradation. Residual contamination may be present in the soils and water involved with the process, or air released from the process. All of these residuals would need to be properly managed. In the cases of water and air, applicable discharge requirements would need to be met. Relevant soil erosion and wetlands requirements due to the excavation of the contaminated soil would also have to be met. Institutional controls would be required. Because this alternative may result in contaminants remaining on-site, CERCLA requires that the site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Alternatives #V7 and #V8:

Alternative #V7 Soil Washing
Capital Cost: $4.0 M
Present Worth Cost: $4.0 M
Time to Implement: 45 months

Alternative #V8 Thermal Desorption
Capital Cost: $5.1 M
Present Worth Cost: $5.1 M
Time to Implement: 41 months

Alternatives #V7 and #V8 consider the use of soil washing and thermal desorption, respectively, to treat soils contaminated with VOCs. The processes of these two technologies were described under the section on treating PCB/PAH contaminated soils. While soil washing was considered an innovative technology for the removal of PCBs and PAHs, it is expected that soil washing will be able to treat the VOC-contaminated soils to levels wellbelow the remediation goals. Similarly, for PCBs and PAHs, thermal desorption's effectiveness in achieving the necessary remediation goals is questioned, however, this technology is expected to achieve the VOC remediation goals since VOCs are more readily driven from soils upon thermal
treatment than PCBs and PAHs. Like bioremediation, approximately 7000 cubic yards of VOC-contaminated soil require treatment. As with other alternatives, the excavation of the contaminated material would have to meet the necessary wetlands and soil erosion requirements. The thermal desorption unit would have to meet necessary air emission requirements. Because this alternative would result in contaminants remaining on-site, CERCLA requires that the site be reviewed every five years. If justified by the review, remedial actions may

be implemented.

Alternative #V9 Ex situ Vapor Extraction

Capital Cost: $1.9 M
Present Worth Cost: $1.9 M
Time to Implement: 47 months

Alternative #V9 would treat VOC-contaminated soils by ex-situ vapor extraction. Ex-situ vapor extraction first requires that soils be excavated. 7000 cubic yards of VOC-contaminated soil would be excavated. During excavation, wetlands and soil erosion requirements would need to be met. The excavated soils would then be placed in a controlled area, and air would be drawn through the soil to remove VOCs from the soil. Vapor extraction should decrease VOCs to below remediation goals. The process would produce VOC emissions that would be required to meet applicable air emission levels. Because this alternative would result in contaminants remaining on-site, CERCLA requires that the site be reviewed every five years. If justified by the review, remedial actions may be implemented.

Lead-contaminated soils

The FS report evaluates, in detail, 7 remedial alternatives for addressing soils contaminated with lead. The top 4 alternatives from the Feasibility Study and the no action alternative are presented here. The remediation goal for lead-contaminated soils is listed on Table 12

Alternative #L1: No Action

Capital Cost: $0.00
O & M Cost: $1300/year
Present Worth Cost: $40,000
Time to Implement: immediate

See description under Alternative #P1.

Alternative #L2: Soil Cover

Capital Cost: $150,000
O & M Cost: $2600/year
Present Worth Cost: $230,000
Time to Implement: 28 months

Alternative #L2 consists of a soil cover over areas of lead greater than the remediation goal and the implementation of institutional controls. The soil cover would be 2 feet deep to prevent contact with the contaminated material. 3.7 acres require covering. Construction of the cover would have to meet any relevant wetlands or soil erosion requirements. Also, relevant flood plain requirements would be met. Because this alternative would result in contaminants remaining on-site, CERCLA requires that the site be reviewed every five years. If justified by the review, remedial actions may be implemented.

Alternative #L3 Impermeable Cap

Capital Cost: $545,000
O & M Costs: $2,600/year
Present Worth: $660,000
Time to Implement: 28 months

Alternative #L3 considers various options for capping lead contaminated soils to meet 10[-7] permeability. Various cap types are considered. All of the capping options would prevent contact with contaminated material. Any cap would have to meet wetlands and soil erosion requirements. Also, any relevant flood plain requirements would need to be met. Institutional controls would be required due to the contamination remaining on-site. Because this alternative would result in contaminants remaining on-site, CERCLA requires that the site be reviewed every five years. If justified by the review, remedial actions may be implemented.

Alternative #L6 Solidification

Capital Cost: $2.8 M
O & M Costs: $1,900/year
Present Worth: $2.9 M
Time to Implement: 28 months

Alternative #L6 is the solidification of lead-contaminated soils. Solidification places lead-contaminated soil in a matrix with a binding material to prevent the migration of lead. 12,000 cubic yards of material would be solidified. This is a common technology for treating inorganic contamination. The implementation of this technology would have to consider its impact on soil erosion and wetlands. Because this alternative would result in contaminants remaining on-site, CERCLA requires that the site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes. Also, institutional controls would be implemented.

Alternative #L7: Excavation and Off-site Disposal

Capital Cost: $10.3 M
Present Worth Cost: $10.3 M
Time to Implement: 31 months

Alternative #L7 consists of excavation and off-site disposal of lead above the remediation goal. This alternative would have to meet wetlands and soil erosion requirements. Also, requirements pertaining to the transport of contaminated materials would have to be met. Approximately 12,000 cubic yards of contaminated soil would be excavated and disposed off-site.

VOC-Contaminated Leachate

The Feasibility Study evaluates, in detail, two remedial alternatives for treating leachate contaminated with VOCs at the site. The portion of the site that will be addressed with these alternatives consists of sections of Areas 1, 1A, and 2. Much of the background concerning these alternatives is contained in the document entitled IRM Work Plan. The area of VOC-contaminated leachate is defined on Table 12.

Alternative #LEACHATE1: No Action

Capital Cost: $0.00
O & M Cost: $3,500/year
Present Worth Cost: $100,000
Time to Implement: immediate

See description under Alternative #P1.

Alternative #LEACHATE2: Leachate Collection and Treatment

Capital Cost: $1.3 M
O & M Cost: $130,000
Present Worth Cost: $1.4 M
Time to Implement: 27 months

Alternative #LEACHATE2 consists of the excavation of leachate collection pits and trenches, treating leachate that collects in the excavation, and discharging the treated water to ground water. Approximately 5.6 million gallons of leachate would require treatment. This alternative would utilize conventional excavation, treatment (such as carbon adsorption) and discharge equipment. It is expected that levels of contamination in the leachate could be highly reduced. The excavation of the trenches and pits would have to meet soil erosion and wetlands criteria. The leachate treatment system and the discharge will meet applicable discharge requirements. If this alternative results in contaminants remaining on site, CERCLA requires that the site be reviewed every five years. A future review should determine if this source removal is protective of ground water and surface water or if further remedial actions for ground water are necessary.

8. Summary of Comparative Analysis of Alternatives

During the detailed evaluation of remedial alternatives, each alternative is assessed against the following nine evaluation criteria.

- Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

- Compliance with applicable or relevant and appropriate requirements (ARARs) addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes and requirements or provide grounds for invoking a waiver.

- Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met.

- Reduction of toxicity, mobility, or volume through treatment is the anticipated performance of the treatment technologies a remedy may employ.

- Short-term effectiveness addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

- Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

- Cost includes estimated capital and operation and maintenance costs, and net present worth costs.

- EPA acceptance discusses if the support agency concurs with the remedy selected by the NJDEPE.

- Community acceptance is assessed based on a review of the public comments received on the RI/FS reports and the Proposed Plan.

A comparative analysis of alternatives based upon the evaluation criteria noted above was performed for each remediation area.

PCB/PAH-Contaminated Soil

The analysis for remediating PCB/PAH-contaminated soils is presented first:

- Overall Protection of Human Health and the Environment

Alternative #P1, no action, would not be protective of human health and the environment because contaminant concentrations pose an unacceptable risk to human health and the environment. Specifically, current levels of PCBs and PAHs at the UOP site pose and unacceptable level of risk. The No Action alternative would not address this risk. Alternative #P2, soil cover, would reduce risk by preventing contact with contaminated soils. However, the covering of contaminated soil would not permanently address contamination. Alternative #P8, soil washing, would permanently remove high levels of PCBs and PAHs from the soil. However, treatability studies have indicated it may be difficult to achieve remedial goals with soil washing. A bench-scale treatability study reduced PCBs in one sample from 850 ppm to 28 ppm and another sample from 360 ppm to 7.5. Alternative #P9, thermal desorption, will permanently remove PCBs/PAHs from the soil. Low levels of contamination may remain in the soil. However, based on the results of treatability studies, it is believed that thermal desorption may be more capable of consistently removing high levels of PCBs and PAHs than soil washing. Treatability studies show that PCB levels could be reduced below detection limits (i.e., 0.8ppm).

. Compliance with ARARs

There are three types of ARARs: action-specific, chemical specific, and location specific. Action-specific ARARs are technology or activity-specific requirements or limitations. Chemical-specific ARARs establish the amount or concentrations of a chemical that may be found in, or discharged to, the environment. Location-specific ARARs are restrictions placed on concentrations of hazardous substances found in a specific location, or the conduct of activities solely because they occur in a specific location. In the absence of an ARAR, the use of other criteria (i.e. To Be Considered or TBC) or risk-based levels may be evaluated.

Alternatives #P1 and #P2 would not meet the cleanup goal for the UOP site since no reduction in levels of PCBs and PAHs would be realized. Alternative #P8, soil washing, will not achieve the remediation goals for the site. Alternative #P9, thermal desorption, may have difficulty achieving cleanup goals for the site. All action alternatives would meet applicable soil erosion and wetlands requirements. Due to the site's location in a tidal flood plain, Alternative #P2 would need to be constructed in a manner to minimize its effect on flooding. Alternative #P9 would also meet the necessary air emission standards.

The Toxic Substances Control Act (TSCA) is a federal law which regulates the management and disposal of PCBs. In general, depending on the nature of the PCB containing material and the PCB concentration in the material, TSCA may require incineration or disposal in a chemical waste landfill approved for PCB disposal. PCBs that are required to be incinerated may also be treated by an approved alternate method that provides PCB destruction equivalent to incineration. The TSCA regulations are applicable to the management and disposal of the PCB contaminated soils once they have been excavated during cleanup.

Under TSCA, an alternative treatment method could be considered equivalent to incineration if it reduces PCBs to concentrations no greater than 2 ppm after treatment. Unless treatment of PCB contaminated soils reduces PCB concentrations to levels below 2 ppm, the residual from the treatment process must be disposed of in a TSCA chemical waste landfill unless a waiver is invoked.

. Long-Term Effectiveness and Permanence

The no action alternative will not affect the levels of PCBs/PAHs in the soil. Contamination will remain on site that presents an unacceptable risk. Alternative #P2, soil cover, could provide some long-term effectiveness provided that the cover is properly maintained. Alternative #P8, soil washing, offers some long-term effectiveness and permanence since it would remove contaminants from the soil. However, soil above the remediation goal may remain. Alternative #P9, thermal desorption, offers the highest degree of long-term effectiveness and permanence since the potential for residuals to be above the remediation goals is less than for Alternatives #P1, #P2 and #P8. All remedies would require five year reviews.

. Reduction in Toxicity, Mobility, or Volume

Both no action and soil cover do not use treatment to reduce toxicity, mobility or volume of contamination in the soil. Thermal desorption permanently reduces toxicity, mobility and volume of the contaminants. Thermal desorption is more likely to remove a greater portion of contaminants than soil washing, leaving less residual contamination in the soil.

. Short-Term Effectiveness

The no action alternative would have no short-term effects. However, current conditions of the site pose an unacceptable level of risk, and no action would not reduce this risk. Alternatives #P2, P8 and P9 share similar short -term effects. The potential short-term risks to human health and the environment are anticipated to be low for each of these alternatives. Specifically, workers implementing any of the three alternatives could be exposed to contamination, but this can be controlled by utilizing proper worker safety methods. All three alternatives may have short-term impacts on soil erosion and wetlands. However, the extent of this effect can be mitigated by compliance with appropriate requirements.

- Implementability

All alternatives discussed concerning PCB/PAH-contaminated soils are implementable. The no action alternative could be easily implemented. Alternative #P2, soil cover, utilizes common construction procedures which are also easily implementable. Although meeting soil erosion requirements would be simpler for Alternative #P2, they are readily achievable for Alternatives P8 and P9. Alternative #P8, soil washing, is an innovative technology. This technology involves a complex treatment and verification monitoring process. Both alternatives P8, and P9 are implementable. However treatability studies show that actual field conditions could warrant the washing of soils multiple times to meet the required soil cleanup levels due to the clay and organic matter content of soils. Alternative #P9, thermal desorption, may also encounter operational difficulties but is more likely to achieve their remediation goals with less reprocessing.

- Cost

The least expensive remedial alternative that addresses PCB/PAH contaminated soils is alternative #P1, no action. Its present worth cost is approximately $40,000. Alternative #P2's present worth cost is $550,000. Alternative #P8's present worth cost is $8.3 M. Alternative #P9's present worth cost is $11.1 M

- EPA Acceptance

The EPA concurs with the selected interim remedy specified on page 25.

- Community Acceptance

Based on comments received during the two public comment periods and the public meeting, the community supports the selected remedy. Public comments and responses are detailed in the responsiveness summary.

Evaluation of Combined Alternatives

The National Contingency Plan sets forth EPA's expectation for the use of treatment at superfund sites. The Agency seeks to treat principal threats, while containment of low level threats is permissible. Examples of principal threats include source materials that are considered highly toxic or highly mobile that generally cannot be reliably contained. Low level threats are materials that can be reliably contained and would present only a low risk in the event of a release. The above section evaluated individual remedial alternatives. However, while evaluating the remedial alternatives for PCB/PAH-contaminated soil, it became apparent that a combination of PCB/PAH alternatives could provide adequate protection of human health while significantly reducing the overall cost of remediation. Specifically, treatment of principal threats and capping of low level threats (i.e., soils containing PCB contamination below 25 ppm) was considered. An analysis of these combinations of alternatives did demonstrate that such a combination can be protective of human health and the environment while decreasing remediation costs by as much as 50 percent. As an example, a combination of thermal desorption and soil cover is protective of human health and the environment; complies with ARARs; provides long-term effectiveness and permanence; reduces toxicity, mobility and volume through treatment; increases implementability, and decreases cost. The cost of the combined remedy, which reduces the volume of soil to be treated and increases the area of soil to be covered is 5.6 M compared to 11.1 M, which would involve treating PCB contaminated soils to 2 ppm.

VOC-contaminated Soils

Following is the analysis for remediating VOC-contaminated soils.

- Overall Protection of Human Health and the Environment

VOCs are present in the soil above the health based levels. Alternative #V1, the no action alternative, would not reduce levels of VOCs in the soil and does not provide protection of human health and the environment because contaminants will continue to leach to ground water. Alternative #V4, bioremediation, may have some difficulty achieving cleanup goals due to its innovative nature. Alternatives #V7, soil washing, and #V8, thermal desorption, are capable of meeting remediation goals for VOCs. Alternative #V9, ex situ vapor extraction, also should achieve remediation goals.

. Compliance with ARARs

The No Action alternative would not comply with the remediation goal for the site. Alternatives V4,V7,V8, and V9 would have to meet applicable wetlands and soil erosion requirements. Alternatives V4,V8, and V9 will meet air emission requirements.

. Long-Term Effectiveness and Permanence

Alternative #V1, no action, will not affect the levels of VOCs in the soil and will not be effective in the long-term. Alternative #V4, bioremediation, will convert VOCs to carbon dioxide and water, permanently destroying the contaminants. Alternatives V7,V8, and V9 will remove VOCs from the soil. The separated VOCs can then be destroyed. With respect to the treatment alternatives, thermal desorption is a permanent and effective technology since it results in destruction of contaminants. Soil washing and biological treatment have the potential to permanently remediate the soils; however some uncertainties exist regarding the effectiveness with which these innovative technologies could remove contaminants from the soil at this site.

. Reduction in Toxicity, Mobility, or Volume

Alternative #V1, no action, does not utilize treatment to reduce the toxicity, mobility, or volume of VOCs in soil. Bioremediation, alternative #V4, will reduce toxicity, mobility and volume, however, the extent of reduction may be insufficient to meet the cleanup goal at the site. Alternatives V7,V8, and V9 reduce toxicity, mobility and volume by removing the VOCs from the soil allowing for their destruction. Alternative #V9, thermal desorption, provides the highest efficiency of removal of contaminants from the soil.

. Short-Term Effectiveness

No action will result in no change to current site conditions. All other alternatives may have to consider short-term effects on soil erosion and wetlands. Also, during implementation of all the alternatives, workers willbe required to have proper training and equipment to prevent short term exposure to VOCs.

. Implementability

The No Action Alternative does not pose an implementation problem, since no activities would be conducted. Both soil washing and thermal desorption are implementable. Thermal desorption would be more easily implemented since it employs fewer steps in its process when compared to soil washing. Soil washing involves a more complex treatment and verification monitoring process. Soils conditions at the UOP (i.e. high clay and organic matter content) could warrant the washing of soils multiple times to meet the required soil cleanup levels. Processing equipment for soil washing must be custom designed according to unique site specifications, whereas thermal desorption units and equipment are readily available for immediate use. For example, thermal units are commonly used for treating soils contaminated with gasoline associated with leaking underground storage tanks. The contaminants associated with these tanks are very similar to those found at UOP. Therefore, the thermal desorption alternative is more easily implemented than soil washing. Sampling of treated soil is necessary for both alternatives, however, the sampling requirements for soil washing are more extensive due to the use of solvents in the treatment process.
Biological treatment has the potential to remediate the soils; however some uncertainties exist regarding its implementability at this site. Since bioremediation relies on the activity of naturally occurring or augmented populations of bacteria, it is necessary to maintain a strict environment for optimum performance. Such conditions may be difficult to maintain at the site. Alternative #V9, ex situ vapor extraction would be fairly easy to implement. The most difficult task with Alternative #V9 would be the capture of fugitive VOC emissions. However, this can be addressed fairly easily by containing the remediation system in some type of

structure.

. Cost

The No Action alternative has a present worth cost of $40,000. Alternative #V4, bioremediation, has a present worth cost of $2.2 M. The present worth cost of Alternative #V7, soil washing, is $4.0 M. The present worth cost of Alternative #V8, thermal desorption is $5.1 M. The present worth cost of Alternative #V9, ex situ vapor extraction is $1.9 M. However, the costs of Alternatives V7 and V8 are much lower when implemented in conjunction with PCB/PAH treatment due to the single set of start-up costs associated with using the same remedial technology on different areas of the site. The cost associated with alternative #V9 when it is also utilized for PCB/PAH treatment is $1 M. The cost of alternative #V8 when it is also utilized for PCB/PAH treatment is $2 M.

. EPA Acceptance

The EPA concurs with the selected interim remedy specified on page 26.

. Community Acceptance

Based on comments received during the two public comment periods and the public meeting, the community supports the selected remedy. Public comments and responses are detailed in the responsiveness summary.

Lead-contaminated Soils

Following is the analysis for remediating lead-contaminated soils.

. Overall Protection of Human Health and the Environment

Alternative #L1, no action, would not be protective of human health due to the presence of lead concentrations greater than those deemed acceptable by the EPA and NJDEPE. Alternative #L2, soil cover, would protect human health by preventing contact with lead at levels greater than the cleanup goal developed for the site. Alternative #L3, capping the contaminated area, prevents contact with contaminated soil. However, capping would require the permanent destruction of some wetlands. #L2 and #L3 require maintenance to perform adequately. Alternative #L6, solidification, provides protection of human health by preventing contact with lead-contaminated soil by placing the soil in a concrete-like matrix. Solidification would also require the permanent destruction of some wetlands. Alternative #L7 would remove all contaminated soils above the remediation objective. However, this alternative may have a significant effect on wetlands during implementation. All alternatives would require a five year review.

. Compliance with ARARs

No action does not meet the remediation goal for the site. All action alternatives should meet the remediation goals for the site. All action alternatives would have to meet wetlands and soil erosion requirements.

. Long-Term Effectiveness and Permanence

No action provides no long-term effectiveness and permanence. All other alternatives leave contaminants on-site, therefore requiring a five year review. If properly maintained all action alternatives should provide longterm effectiveness. Alternative #L2, soil cover, will remain effective, if properly maintained, by preventing contact with lead-contaminated soils. Alternative #L3, capping, prevents contact with contaminated soils, and, in addition, would mitigate the leaching of lead to ground water. For Alternative #L3, proper maintenance would be required to achieve this. Alternative #L7, excavation and off-site disposal, provides long-term effectiveness by removing all soils present on-site above the remediation goal. Due to the isolated and industrial nature of the area institutional controls should be fairly easy to implement and maintain.

. Reduction in Toxicity, Mobility, or Volume

No action provides no reduction in toxicity, mobility or volume of contaminants. Alternatives #L2 and #L3 do not utilize treatment to reduce toxicity, mobility or volume. Alternative #L6 reduces mobility by placing lead in this solid matrix, but increases the total volume of material. Alternative #L7 does not utilize treatment to reduce toxicity, mobility, or volume.

. Short-Term Effectiveness

No action does not provide short-term effectiveness due to the presence of lead above remediation goals at the site. All action alternatives will have to utilize proper worker safety procedures, and soil erosion and wetlands mitigation procedures to minimize any short-term impacts.

. Implementability

All alternatives discussed concerning lead-contaminated soil are implementable. No action would be the simplest to implement. Soil cover would be the next simplest to implement. Action alternatives will have to meet wetlands and soil erosion requirements during implementation. Due to the nature of the area, a former municipal fill area which is now covered with well developed trees, implementing capping, solidification, and excavation alternatives may prove difficult due to limited access to the area. To gain access for the heavy equipment that would be required to implement this alternative, it would be necessary to destroy a large portion of the site's trees. Due to the industrial history of the site, the placement of use restrictions should be easy to implement.

. Cost

The present worth value of the no action alternative is $40,000. Alternative #L2's present worth cost is $230,000. The present worth cost of capping, alternative #L3, is $645,000. The present worth cost of solidification is $2.9 M. The present worth cost of Alternative #L7 is $10.3 M.

. EPA Acceptance

The EPA concurs with the selected interim remedy specified on page 26.

. Community Acceptance

Based on comments received during the two public comment periods and the public meeting, the community supports the selected remedy. Public comments and responses are detailed in the responsiveness summary.

VOC-contaminated Leachate

Following is the analysis for remediating VOC-contaminated leachate.

. Overall Protection of Human Health and the Environment

No action would not reduce VOCs in the leachate to concentration levels that are protective of human health and the environment. Alternative #LEACHATE2 will achieve levels that are protective of human health and the environment by collecting leachate and treating the contaminated leachate. Final analysis if further remediation is needed to protect ground water and surface water will occur in the future.

. Compliance with ARARs

No action would not meet remediation goals for the site. Alternative #LEACHATE2 will meet the guidance, soil erosion and wetlands requirements, and ground water treatment and discharge requirements.

. Long-Term Effectiveness and Permanence

Alternative #LEACHATE1 provides no long-term effectiveness and permanence. Alternative #LEACHATE2 will permanently remove VOC leachate and will prevent leachate from entering the ground water.

- @ Reduction in Toxicity, Mobility, or Volume

No action will not reduce toxicity, mobility, or volume of VOCs in the ground water. Alternative #LEACHATE2 will reduce toxicity, mobility and volume by removing and treating VOCs in the leachate.

. Short-Term Effectiveness

No action is not effective in the short term due to the presence of VOCs above the remediation goal. Mitigation measures for soil erosion and wetlands may be necessary to minimize short-term effects for Alternative #LEACHATE2.

. Implementability

The no action alternative would be very easy to implement. Alternative #LEACHATE2 should be fairly simple to implement. It is expected that this will be fairly easy to implement because it utilizes standard technologies such as excavation and conventional treatment technologies. It would be required that all substantive permits requirements, such as discharge limits to groundwater, be met to proceed with this remedy.

. Cost

The present worth cost of no action is $100,000. The present worth cost of Alternative #LEACHATE2 is $1.4 M.

. EPA Acceptance

The EPA concurs with the selected interim remedy specified on page 26.

. Community Acceptance

Based on comments received during the two public comment periods and the public meeting, the community supports the selected remedy. Public comments and responses are detailed in the responsiveness summary.

9. Selected Remedy

For PCB/PAH-contaminated soils, the selected remedy is a combination of Alternatives #P2 and #P9:

. Thermal desorption for highly contaminated soils

. Soil cover for less contaminated soil

. Institutional controls.

Some TSCA equivalent levels will not be met in certain areas of the site. Soil cover will be placed over these areas containing residual contamination. Highly contaminated soils is defined as those soils with a PCB concentration greater than 25 mg/kg and total carcinogenic PAHs greater than 29 mg/kg. Treatment of these soils will reduce PCB concentrations to <10 ppm and carcinogenic PAHs <20 ppm. Remaining soils and treatment residuals that exceed the remediation goals will be placed under a two foot soil cover and be subject to deed restrictions on that portion of the site. It is the responsibility of the state to ensure that the owner is aware of the deed restrictions. Figure 10 shows the PCB/PAH remediation area.

The selected remedy will excavate and treat approximately 6,800 yd[3] of contaminated soil and require a soil cover area of approximately 4.9 acres. The cost of the combined remedy is $5.6 million.

For VOC-contaminated soil, the selected remedy is Alternative #V8:

- Thermal Desorption

The cleanup goal for VOCs in soil is 1000 ppm. The selected remedy will excavate and treat approximately 7,200 yd^3 of soil at a cost of $2 M. The approximate area affected by this remediation is shown on Figure 11. In addition to the VOC-contaminated soil, this treatment will be utilized to treat contaminated sediment associated with the site sewer systems.

For lead-contaminated soils, a combination of Alternatives #L2 and #L3 was selected:

- Soil cover/impermeable cap

- Institutional controls.

The cleanup goal of 600 ppm is based on NJDEPE and EPA guidance. The lead contaminated soils will undergo toxicity characteristic leaching procedure (TCLP) testing to determine whether lead exhibits the characteristic of toxicity at the UOP site. Approximately 3.7 acres will be covered by a soil cover/impermeable cap. Figure 12 illustrates the location of soils above the remediation goal. The purpose of the soil cover/cap is to construct an low permeability layer to prevent surface water/stormwater infiltration through lead-contaminated material. Also, the cover/cap will be designed to prevent surficial contact with the contaminated material. The cap shall have a permeability equal to or less than 1×10^{-7} cm/sec. Institutional controls will be placed on the property through the use of deed restrictions. The present worth of this alternative is $550,000. This cost represents the cost of combining alternatives #L2 and #L3.

For VOC-contaminated leachate, Alternative #LEACHATE2 was selected:

- Leachate collection from trenches/pits

- On-site leachate treatment

- Discharge to ground water

The area of leachate removal is defined as 1 ppm individual VOC/10 ppm total VOCs. This area is illustrated in Figure 13. This removal is designed to protect Ackerman's Creek from the discharge of contaminated leachate. Implementation time of this portion of the remedy would be approximately 27 months. Implementation time includes remedial design, construction and operation periods. The system would operate for approximately four of those months. Upon completion of this portion of the remedy, it will be necessary to evaluate if this remedy removed levels of organic contamination that is protective of ground water and surface water. This evaluation should determine if contaminant mass reduction from the leachate removal was sufficient to protect the surface water quality of Ackerman's Creek. If it is not, further ground water remedial work would be required. It is estimated that this alternative will require the treatment of 5.6 million gallons of leachate. The present worth cost of this portion of the selected remedy is $1.3 million.

10. Statutory Determinations

Protection of Human Health and the Environment.

The selected remedy is protective of human health and the environment. Soils contaminated with high levels of PCBs and PAHs will be treated by thermal desorption. Soils contaminated with lower levels of PCBs and PAHs will be contained by a soil cover and controlled by institutional controls. This combination removes high level contamination and prevents exposure to low level contamination. For VOC-contaminated soils, soils above the cleanup goal will be treated by thermal desorption. Soils contaminated with lead will be contained by a soil cover/cap and controlled by institutional controls preventing contact with surficial contamination and the potential leaching of lead to ground water. VOC-contaminated leachate will be collected and treated.

This selected remedy will reduce contamination at the UOP site to within acceptable levels. An evaluation of the protectiveness of the leachate remedy to ground water and surface water will have to be conducted after completion of this remedy. Although some short-term risk is associated with these actions, proper mitigation procedures will keep short-term risks within an acceptable level.

Compliance with Applicable or Relevant and Appropriate Requirements.

The selected remedy will comply with federal and state Applicable or Relevant and Appropriate Requirements (ARARs) except the chemical waste landfill requirements which EPA is waiving in this ROD for the UOP site. These include:

Action Specific

- New Jersey Pollutant Discharge Elimination System (NJPDES)
  - Discharge to Ground Water Permit, N.J.A.C. 2.1 et seq. and 6.1 et seq.

- Permit to Construct/Install/Alter Air Quality Control Apparatus/Equipment, N.J.A.C. 7:27-8 et seq.

- National Ambient Air Quality Standards, 40 CFR Part 50 of the Clean Air Act

- Soil Erosion and Sediment Control Plan Certification, N.J.A.C. 2:90

Location Specific

- Section 404 and Executive Order 11990 require impacts to wetlands be avoided or minimized.

- Stream Encroachment, N.J.A.C. 7:8-3.15 et seq.

- Freshwater Wetlands Protection Act, N.J.A.C. 7:7A

- Hackensack Meadowlands Development Commission, N.J.S.A. 13:17-1 et seq.

- Executive Order 11988 requires that a floodplains assessment must be completed for the site, including a mitigation plan. Additionally, since actions at CERCLA sites are considered "critical actions", the floodplain delineation/assessment must include consideration of the project's impacts on the 500-year floodplain.

- Coastal Zone Management Act 16 USC 1451

Chemical Specific

- New Jersey Soil Quality Criteria - The soil quality criteria are a To Be Considered. The soil quality criteria are risk based numbers designed to provide protection to human health and the environment. The Toxic Substances Control Act (TSCA) is a federal law that regulates the disposal of PCBs. In general, depending on the nature of the PCB containing material and the PCB concentration in the material, TSCA may require incineration or disposal in a chemical waste landfill approved for PCB disposal. PCBs that are required to be incinerated may also be disposed of by an approved alternative method that provides PCB destruction equivalent to incineration. The TSCA regulations are applicable to the disposal of the soils once they have been excavated during cleanup.

TSCA regulations require that treatment of the soils must be equivalent to incineration and must therefore reduce PCBs to concentrations no greater than 2 ppm after treatment. Unless treatment of PCB contaminated soils reduces PCB concentrations to levels below 2 ppm, the residual from the treatment process will be disposed of in an on-site TSCA chemical waste landfill. EPA "Guidance on Remedial Actions for Superfund Sites with PCB Contamination" (OSWER Directive 9355.4-01, August 1990) allows the TSCA landfill requirements to be waived at Superfund Sites in the ROD provided that: there are low PCB concentrations; a protective cover system is designed and installed and PCB migration to groundwater and surface water is evaluated. Under an industrial use scenario, EPA considers 10 - 25 ppm of PCBs to be protective. This ROD is requiring the placement of a soil cover over the residual soils from the treatment system (i.e., soils with concentrations less than 10 ppm). The soil cover will prevent treated soils from becoming airborne and erosion of treated soils (including erosion into surface water). With respect to PCB migration to groundwater, the Directive states that generally, PCB concentrations that are protective of human health via direct contact exposure would be protective of the groundwater. Additionally, since the landfilled materials are residuals from a thermal treatment process, contaminants that might enhance PCB migration (e.g., volatile organics) would be driven off. As a result, EPA is waiving TSCA chemical waste landfill requirements at the UOP site for this ROD since the residuals (i.e., PCB levels less than 10 ppm) from the treatment process for this selected remedy do not present an unreasonable risk of injury to health or the environment from PCBs.

Cost-Effectiveness.

The combination of alternatives selected for this remedial action is cost effective and provides for the protection of human health and the environment. Two factors greatly increased the cost effectiveness of the selected remedy. First, the selection of the same technology for treating PCB/PAH contaminated soils and VOC-contaminated soils greatly reduces the overall cost of the remediation. By utilizing one technology, only one set of start-up costs will be realized and the greater volume of material will help decrease unit costs. Also, the use of a combined alternative for treating PCB/PAH contaminated soils will reduce the overall cost while still providing protectiveness.

Utilization of Permanent Solutions and Alternative Treatment (or resource recovery) Technologies to the Maximum Extent Practicable (MEP).

The selected remedy meets the statutory requirements to utilize permanent solutions and alternative treatment technologies to the maximum extent practical. Alternative treatment technologies will be utilized for PCB/PAH-contaminated soil, VOC-contaminated soil, and VOC contaminated leachate. Due to the location, the lack of identifiable source areas, and the heterogenetic physical characteristics of the contaminated material, treatment alternatives were not practical for the lead-contaminated soil so, therefore, a containment alternative will be utilized.

For PCB/PAH-contaminated soils, Alternative #P9, thermal desorption, provides the most long-term effectiveness and permanence by treating the contaminated soils. Alternative #P8, soil washing, also provides long-term effectiveness and permanence by treating the contaminated soils. However, it is questionable whether soil washing can remove as great a level of contaminants as thermal desorption. Alternative #P2, soil cover does not remove any of the PCB/PAH contamination from the soil. However, if the soilcover is properly maintained over time, it should provide some long-term effectiveness. No action provides no long term effectiveness or permanence. The combination of Alternative #P9 and #P2 provides long-term effectiveness and permanence by treating the highly contaminated soils, but will require long-term maintenance of the soil cover to insure long-term effectiveness of the soil cover over less contaminated soils.

For VOC-contaminated soils, Alternative #V8, thermal desorption will provide long-term effectiveness and permanence by removing the VOC contamination from the soil. Alternative #V9, ex situ vapor extraction, would provide long-term effectiveness and permanence by removing the VOC contamination from the soil. Alternatives #V4 and #V8, bioremediation and soil washing, if implemented successfully, would also permanently remove VOCs from contaminated soils. However, some uncertainty does exist concerning these technologies ability to fully treat the soils. No action provides no long-term effectiveness or permanence.

For lead-contaminated soils, Alternative #L7, off-site disposal, would provide long-term effectiveness and permanence by removing all soils above the remediation goal. Alternative #L3, capping of contaminated material, would provide long-term effectiveness and permanence by preventing contact with the contaminated soils and preventing the potential leaching of lead contamination to the underlying ground water.

Maintenance of the cap would be required to insure this long-term effectiveness. Alternative #L6, solidification, would provide long-term effectiveness and permanence by placing lead contaminated soils in a solid matrix. This matrix would prevent the potential leaching of lead to ground water. However, due the extremely heterogenic nature of soils at the site, it is questionable whether such a matrix could provide long-term stability. Alternative #L2, soil cover would provide long-term effectiveness by preventing contact with contaminated soils. No action would provide no long-term effectiveness or permanence. A combination of alternatives #L2 and #L3, a modified soil cover/cap should provide long-term effectiveness by preventing contact with contaminated material and limiting the potential leaching of lead-contaminated material to ground water. This limiting of leaching as compared to the prevention of leaching provided by alternative #L3 should be sufficiently protective based on the low leaching potential of the lead contaminated material at UOP as demonstrated by the results of leachability testing.

For VOC-contaminated leachate, Alternative #LEACHATE2 provides long-term effectiveness and permanence by removing and treating VOCs present in the leachate. The protectiveness of this action to ground water and surface water will be evaluated upon completion of this source removal action. No action provides no long-term effectiveness or permanence.

Alternative #P9, thermal desorption reduces the toxicity, mobility and volume of PCB/PAH-contaminated soils through treatment. Thermal desorption separates contaminants from soil allowing for the easy destruction of those contaminants. Treatability studies have demonstrated that thermal desorption can effectively treat site soils. Alternative #P8, soil washing, also treats PCB/PAH-contaminated soils to reduce toxicity, mobility, and volume. Soil washing uses an organic solvent to remove the contaminants. A treatability study performed with the soil washing technology showed that it may have some difficulty removing low levels of contaminants. Alternatives #P1, no action, and #P2, soil cover, do not utilize treatment to reduce toxicity, mobility, or volume. The combination of alternatives #P2 and #P9 retains the use of treatment to reduce toxicity, mobility and volume.

Alternatives #V8, thermal desorption, and #V9, ex situ vapor extraction, reduce toxicity, mobility and volume by treatment. Both these technologies separate VOC contamination from soil which allows for easy destruction of the contaminant of concern. Alternative #V4, bioremediation, and #V7, soil washing, can reduce toxicity, mobility, and volume by treatment if they work effectively. However, both these technologies are innovative and some question exists if they could reduce levels of contamination to acceptable levels. No action does not provide any treatment.

Alternative #L6, solidification, does provide treatment to lead contaminated soil. This treatment would reduce mobility of the lead, however, it would increase the volume of lead contaminated material. No other alternative provides treatment to the lead contaminated soil. Alternative #L3, capping, would reduce mobility by preventing the leaching of lead contaminated materials. The combination of alternatives #L2 and #L3 would reduce the mobility of lead-contaminated material but not through treatment.

VOC-contaminated leachate will be treated in Alternative #LEACHATE2 reducing the toxicity, mobility and volume of the contaminants. Alternative #LEACHATE1 provides no treatment.

No action for PCB/PAH-contaminated soils would have no short-term effects but current levels of PCBs and PAHs on site provide an unacceptable level of risk. All action alternatives for PCB/PAH-contaminated soils may have some short-term adverse effects. Many of these relate to the exposure of remediation workers to site contaminants which can be minimized by following proper health and safety requirements when implementing the project. The action alternatives also can have short-term effects on soil erosion and wetlands. These effects can be minimized by following the proper mitigation procedures that are applicable to this project.

Similar short-term effects are seen for VOC-contaminated soils, lead-contaminated soils, and VOC-contaminated leachate. Like the PCB/PAH-contaminated soil, adverse short-term effects can be mitigated by following applicable guidelines and regulations.

No action is the most easily implemented alternative for PCB/PAH contaminated soil. Alternative #P2, soil cover, would be fairly easy to implement. Soil erosion prevention would have to be considered during implementation. Alternative #P9, thermal desorption, is a fairly complex, innovative technology and could have some operational difficulties. However, thermal desorption is a quickly developing technology whose use is becoming fairly commonplace. Alternative #P8, soil washing, also is an innovative technology. Soil washing utilizes a very complex treatment train that could lead to difficulty in its implementation. A combination of alternatives #P2 and #P9 should be as easy to implement as either alternative by itself.

No action is the most easily implemented alternative for VOC contaminated soils. Alternative #V9, ex situ vapor extraction would be fairly easy to implement. The most difficult task with Alternative #V9 would be the capture of fugitive VOC emissions. However, this can be addressed fairly easily by containing the remediation system in some type of structure. Alternative #V8, thermal desorption, is a technology commonly used to treat contaminants similar to those found in the VOC-contaminated soil. Alternative #V7, soil washing, could be difficult to implement for VOC-contaminated soils for the same reason it is difficult to implement for PCB/PAH-contaminated soils. Alternative #V4, bioremediation, is an innovative technology that relies on the activity of microbes to degrade organic contaminants. The amount of biological activity is highly dependent on maintaining a highly controlled environment for the microbes to function. The difficulty in maintaining this environment leads to difficulty in properly implementing this technology.

Alternative #L1, no action, is the easiest alternative to implement. Soil cover would also be fairly easy to implement. This alternative would need to meet wetland and soil erosion requirements during implementation. Alternative #L3 would also be fairly easy to implement and also would have to meet wetlands and soil erosion requirements. Alternative #L7, excavation and offsite disposal would be relatively easy to implement. In addition to the soil erosion and wetlands questions like that of alternatives #L2 and #L3, this alternative would have to consider the logistical questions related to the large number of trucks that would be required to implement this alternative. A combination of alternatives #L2 and #L3 should be no more difficult to implement than either of the individual alternatives.

The present worth cost of Alternative #P1 is $40,000. The present worth cost of Alternative #P2 is $550,000. Alternative #P8's present worth cost is $8.3 M. Alternative #P9's present worth cost is $11.1 M. The combined alternative of #P2 and #P9 has a present worth cost of $5.6 M.

The present worth of Alternative #V1 is $40,000. Alternative #V9, ex situ vapor extraction, has a present worth cost of $1.9 M. Alternative #V4, bioremediation, has a present worth cost of $2.2 M. The present worth cost of Alternative #V7, soil washing, is $4.0 M. The present worth cost of Alternative #V8, thermal desorption, is $5.1 M. If alternative #P9 is selected for treating PCB/PAH-contaminated soils, the cost of Alternative #V8 is reduced to $2 M.

All these criteria played some role in determining which alternatives were selected. For the selection of the combination of Alternative #P2 and Alternative #P9, cost played a very significant factor. It was determined that great cost saving could be realized using a combined alternative while still providing an ample margin of protectiveness, still utilize treatment, and be fairly easy to implement. For VOC-contaminated soil, cost also played a critical role. By selecting Alternative #V8, thermal desorption, the same technology selected for PCB/PAH contaminated soils, tremendous cost savings were realized while still providing protectiveness, treatment, and implementability. Long-term effectiveness provided the main thrust for selecting the combination of alternatives #L2 and #L3 for lead-contaminated soil. This combination was the remedy that appeared to have the greatest probability of providing long-term effectiveness and permanence. Like the selection of the lead alternative, long-term effectiveness and permanence was the main factor leading to the selection of Alternative #LEACHATE2.

The U.S. EPA played an important role in shaping the remedy presented here. Based on comments received from the EPA during the initial public comment period and during preparation of the second proposed plan several alterations were made to the selected remedy. The U.S. EPA concurs with the remedy selected in this ROD.

An opportunity for community involvement was provided in the remedy selection process detailed in this ROD. Comments received are addressed in the Responsiveness Summary.

Preference for Treatment as a Principal Element

The remedy selected in this ROD meets the statutory preference for treatment as a principle element. Treatment is utilized for several of the principal threats present at the site. Thermal desorption will be used to treat soils contaminated with high levels of PCBs and PAHs. Thermal desorption will also be used to treat soil contaminated with high levels of VOCs that act as a source of contamination to ground water and surface water. Also, treatment will be used for VOC-contaminated leachate that also acts as a source of contamination to ground water and surface water. Soil cover/capping, a containment remedy was the selected remedial alterative for lead-contaminated soil. A containment strategy was chosen over a treatment remedy because the cost associated with lead removal was high compared to the added risk reduction that would be achieved by this removal.

11. Documentation of Significant Changes

Several modification were made to the proposed plan that was issued in August 1992. These modifications were based on comments received from the U.S. EPA and discussions held between the NJDEPE and U.S. EPA. These modifications were all included in the proposed plan released on May 3, 1993. The modifications are as follows:

1. The remedy selected in this ROD is an interim remedy. Upon completion of the selected remedy, an evaluation will have to be performed to determine what final remedy will be selected for this operable unit of the site. This evaluation will determine if the VOC-contaminated soil treatment and leachate removal were sufficient to protect the surface water quality of Ackerman's Creek and ground water. If these actions were protective, no further action would be required. If these actions were not protective, further remedial actions pertaining to VOC-contaminated soil and ground water would be required.

2. The originally proposed plan included a ground water remedy. The second proposed plan and the ROD consider this remedy to be strictly for source areas/leachate. The need for a full ground water remedy will be determined upon completion of this source removal.

3. Notification that Toxic Substance and Control Act (TSCA) landfill requirements would be waived was explicitly stated in the second proposed plan.

4. All lead-contaminated soil will be contained on-site. No lead contaminated soil would be excavated and disposed off-site as included in the first proposed plan. It was determined that little added risk reduction would be achieved by this removal.

5. A risk-based remediation goal was established for 1,1,2,2tetrachloroethane. This remediation level was developed by the U.S. EPA and was more stringent that the NJDEPE-developed cleanup goal.

Based on these changes, a second proposed plan was released to the public and a second public comment period was held. No public comments were received which warranted a change in the remedy presented in the second Proposed Plan.

Table 12

Remediation Goals

Contaminant	Remediation Goal, ppm
For Surface Soil:	
Carcinogenic PAHs	
Benzo(b)fluoranthene	4
Benzo(a)anthracene	4
Benzo(a)pyrene	0.66
Benzo(k)fluoranthene	4
Chrysene	40
Dibenzo(a,h)anthracene	0.66
Indeno(1,2,3-cd)pyrene	4
PCB	2
Lead	600
For All Soils:	
VOCs (total)	1000
1,1,2,2-Tetrachloroethane	21

Leachate Delineation Area

Contaminant	Delineation Criteria, ppm
VOCs (total)	10 mg/l
VOCs (individual)	1 mg/l